DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the suitable sterilization approach for sterilization of various drainage systems, especially a cooling water system, and sterilization of a medical-application machine instrument.
[0002]
[Description of the Prior Art] From the former, chlorinated pesticides, such as a hypochlorous acid, are widely used as insurance and a reliable disinfectant, and a germicide. Specifically, the hypochlorous acid is used for the disinfection and sterilization of a drainage system of water and sewage, various industrial effluent, a pool, etc. Moreover, the water solution of a hypochlorous acid is used also for disinfection and sterilization of a medical-application machine instrument as an antibacterial or sterilization liquid.
[0003] However, although a hypochlorous acid demonstrates outstanding sterilizing properties by the acid drainage system depending on pH of the drainage system by which the sterilizing properties of a hypochlorous acid (HOCl) were added, a hypochlorous acid is dissociated by the hypochlorite (OCl-) in the neutral - alkaline drainage system according to which pH exceeds 6.5, sterilizing properties decline, and the sterilizing properties decline [especially pH] rapidly by eight or more drainage systems. Moreover, even if little, it is apprehensive also about the corrosion problem of metallic materials, such as iron of the structure which holds a drainage system, copper, aluminum, and stainless steel, with existence of a chlorinated pesticide.
[0004] Then, hypobromous acid (HOBr) is proposed as a germicide which sterilizing properties are not influenced by the pH value and the corrosion problem over a metallic material cannot produce easily. Although hypobromous acid is obtained by making a bromine act on the water solution of a strong base, since it is chemically unstable, it is intolerable to prolonged preservation. then, the hypochlorite containing ClO- and the bromination containing Br- it mixes, just before adding a salt (for example, sodium bromide) to a drainage system, and after blowing ozone into the approach (patent No. 2716126) of adding to this drainage system, and underwater [containing bromine ion] and changing 80% or more of bromine ion into hypobromite, the method (JP,7-57721,B) of pouring this into the drainage system of pH 8-9 is proposed.
[0005] However, by these approaches, the unreacted hypochlorite remained in the drainage system and there were a problem that expected sterilizing properties are not obtained, and a problem of the cost of needing an expensive ozone generator.
[0006]
[Problem(s) to be Solved by the Invention] This invention makes hypobromous acid and/or hypoiodous acid generate cheaply, safely, and simple, and makes it a technical problem to offer the approach of sterilizing the drainage system for sterilization by this.
[0007]
[Means for Solving the Problem] The matter, peracetic-acid water solution, or hydrogen-peroxide-

solution solution which can generate a peracetic acid or a hydrogen peroxide in the artificers of this invention making hypobromous acid and/or hypoiodous acid exist in the drainage system for sterilization, and sterilizing a drainage system, Mix the water solution containing the matter or the bromine ion and/, or the iodine ion which can supply bromine ion and/, or iodine ion in the drainage system for sterilization, or Or a peracetic-acid water solution or a hydrogen-peroxide-solution solution, The water solution containing bromine ion and/or iodine ion is mixed beforehand. The hypobromous acid and/or hypoiodous acid which are obtained by adding the obtained germicide content mixed liquor to the drainage system for sterilization came to complete a header and this invention for the fact of demonstrating an effective bactericidal effect by the drainage system.
[0008] In this way, according to this invention, the water solution containing the matter or the bromine ion and/, or the iodine ion which can supply the matter, peracetic-acid water solution or hydrogen-peroxide-solution solution which can generate the (A) peracetic acid or a hydrogen peroxide, and (B) bromine ion and/or iodine ion is mixed in the drainage system for sterilization, and the sterilization approach of the drainage system characterized by sterilizing this drainage system is offered.
[0009] Moreover, according to this invention, (A) peracetic-acid water solution or a hydrogen-peroxide-solution solution, and the water solution containing (B) bromine ion and/or iodine ion are mixed beforehand, the obtained germicide content mixed liquor is added to the drainage system for sterilization, and the sterilization approach of the drainage system characterized by sterilizing this drainage system is offered. In addition, in the following explanation, especially, as long as there is no notice, "% of the weight" is meant"%."
[0010]
[Embodiment of the Invention] As matter which can generate the peracetic acid used by this invention, "BYUSAN (BUSAN) 1000" by Buckman laboratory incorporated company currently sold by Nagase& Co., Ltd. is mentioned, for example. If it dissolves in water, this BYUSAN 1000 is powder pharmaceutical preparation which generates a peracetic acid, and is known as a versatility disinfection agent. When this is dissolved in water by the concentration of 1 g/l, the peracetic acid of 350 mg/l extent generates.
[0011] Moreover, a peracetic-acid water solution is obtained by dissolving in water the matter which can generate a peracetic acid or a peracetic acid so that peracetic-acid concentration may turn into desired concentration. As a peracetic acid, what is marketed as industrial use can usually be used, for example, the thing of a presentation of the thing of a presentation of the thing of a presentation of 6% of peracetic acids, 32% of acetic acids, 54% of water, and 8% of hydrogen peroxides, 32% of peracetic acids, 4% of acetic acids, and 64% of water and 26% of peracetic acids, 54% of acetic acids, and 20% of water etc. is mentioned.
[0012] As matter which can generate the hydrogen peroxide used by this invention, inorganic peroxy acids, these salts (for example, fault sodium carbonate), etc., such as perboric acid, fault carbonic acid, and peroxysulfuric acid, are mentioned, for example.
[0013] Moreover, a hydrogen-peroxide-solution solution is obtained by dissolving in water the matter which can generate a hydrogen peroxide or a hydrogen peroxide so that hydrogen-peroxide concentration may turn into desired concentration. As a hydrogen peroxide, the hydrogen-peroxide-solution solution of 3 - 60% of concentration marketed as industrial use can usually be used.
[0014] Furthermore, the hydrogen peroxide generated underwater can also be used. As an approach of generating a hydrogen peroxide underwater, the approach of irradiating high energy lines, such as electrochemical disassembly of water or an alkali solution, ultraviolet rays, and a radiation, at water or approaches, such as a metabolic turnover by the living thing [for example, Poecillia vellifere (Cyprinodontiformes Poeciliidae)] of an aquatic life, are mentioned.
[0015] As matter which can supply the bromine ion and/, or the iodine ion used by this invention, a bromide, iodides, etc. of alkali metal, such as a sodium bromide, a potassium bromide, a sodium iodide, and potassium iodide, are mentioned, for example.
[0016] Moreover, it is obtained by dissolving the matter which can supply bromine ion or iodine ion, i.e., the matter which dissociates ion underwater and can generate bromine ion or iodine ion, a

hydrobromic acid, or a hydroiodic acid in water as a water solution containing bromine ion and/, or iodine ion, so that it may become desired concentration.
[0017] Each the above-mentioned bromide or above-mentioned iodide of alkali metal is desirable especially from the solubility to water being high, when it can obtain cheaply industrially, and the water solution which dissolved these in water is chemically stable, and can be saved at stability for a long period of time. Therefore, these water solutions can be saved at a storage tank, and an initial complement can be used at any time.
[0018] Moreover, it can dilute with water and a hydrobromic acid and a hydroiodic acid can be used so that it may become the concentration of a request of the hydrogen bromide water solution (for example, the hydrobromic acid, about 47%) and hydrogen iodide water solution (for example, the hydroiodic acid, about 58%) which are marketed by industrial use.
[0019] In this invention, the hypobromous acid and/or hypoiodous acid which are obtained by adding what was mixed in the drainage system for sterilization, or mixed beforehand the above-mentioned peracetic acid or the component (A) of a hydrogen peroxide, and the component (B) of bromine ion and/or iodine ion to the drainage system for sterilization are used as a sterilization active principle. Although especially the combination of these components (A) and components (B) is not limited, especially its combination with combination with the water solution of the bromide of ** peracetic-acid water solution and alkali metal or an iodide and ** hydrogen-peroxide-solution solution and a hydrobromic acid, or a hydroiodic acid is desirable.
[0020] In the case of the combination of above **, the mol concentration of the peracetic acid in a peracetic-acid water solution is 0.05 - 0.1 mol/l more preferably 0.01 to 0.5 mol/l 0.000074 to 1 mol/l.
[0021] Moreover, the mol concentration of the bromide of alkali metal, the bromide in the water solution of an iodide, and/or an iodide is 0.05 - 0.1 mol/l more preferably 0.05 to 0.5 mol/l 0.00016 to 1 mol/l.
[0022] If the mol concentration of each water solution is the above-mentioned range, it is desirable in respect of reaction time with the handling nature of each water solution, safety, solubility and a peracetic acid, bromine ion, and/or iodine ion etc. As for the mole ratio with the bromide of a peracetic acid and alkali metal, and/or an iodide, about 1:1-1:10 is desirable.
[0023] If the water solution of the bromide of a peracetic-acid water solution and alkali metal and/or an iodide is mixed, according to the following reaction formula, an acetic acid, hypobromous acid, and/or hypoiodous acid will generate.
CH3 COOOH+X-+H+->CH3 COOH+HXO (X shows Br or I among a formula)
If the mol concentration of the bromide of alkali metal and/or an iodide is highly set up when the mol concentration of a peracetic-acid water solution is comparatively low, the generation reaction of hypobromous acid and/or hypoiodous acid will advance efficiently.
[0024] If it is not necessary to complete the above-mentioned reaction 100% and the hypobromous acid and/or hypoiodous acid of a sterilization effective dose exist in the drainage system for sterilization, the purpose of this invention will be attained. In addition, since a bactericidal effect is conjointly demonstrated with the germicidal action of the hypobromous acid which is a germicide with itself effective [an unreacted peracetic acid], and is a resultant, and/or hypoiodous acid, superfluous addition of a peracetic acid is one of the desirable embodiments of this invention. However, since there is a possibility of causing and attracting the corrosion of the iron system metal of the structure which holds a drainage system, as for adding 25 or more mg/l of peracetic acids to the drainage system for sterilization, avoiding is desirable. Moreover, a high-concentration peracetic acid is handling top risk, and since it is easy to decompose, it is not desirable.
[0025] In the case of the combination of above **, the mol concentration of the hydrogen peroxide in the hydrogen-peroxide-solution solution used is 0.03 - 3 mol/l more preferably 0.03 to 5 mol/l 0.01 to 10 mol/l.
[0026] Moreover, the mol concentration of the hydrogen bromide in a hydrobromic acid and/or a hydroiodic acid and/or hydrogen iodide is 0.1 - 10 mol/l more preferably 0.1 to 15 mol/l 0.01 to 30 mol/l.
[0027] If the mol concentration of each water solution is the above-mentioned range, it is desirable in

respect of reaction time with the handling nature of each water solution, safety, solubility and a hydrogen peroxide, bromine ion, and/or iodine ion etc. As for the mole ratio with a hydrogen peroxide, a hydrogen bromide, and/or hydrogen iodide, 1:1 to about 1:5 are desirable.

[0028] If a hydrogen-peroxide-solution solution, a hydrobromic acid, and/or a hydroiodic acid are mixed, according to the following reaction formula, water, hypobromous acid, and/or hypoiodous acid will generate.

$H_2O_2+XH \rightarrow H_2O+HXO$ (X shows Br or I among a formula)

If the mol concentration of a hydrogen bromide and/or hydrogen iodide is highly set up when the mol concentration of a hydrogen-peroxide-solution solution is comparatively low, the generation reaction of hypobromous acid and/or hypoiodous acid will advance efficiently.

[0029] Although the purpose of this invention will be attained if the hypobromous acid and/or hypoiodous acid of a sterilization effective dose exist in the drainage system for sterilization, an unreacted hydrogen peroxide disassembles the hypobromous acid and/or hypoiodous acid which are a resultant, or has a possibility of causing and attracting the corrosion of the iron system metal of the structure which holds a drainage system. Therefore, that of **** for excessive amounts is desirable to a hydrogen peroxide in a hydrobromic acid and/or a hydroiodic acid.

[0030] The reaction with a reaction with the bromide of a peracetic acid and alkali metal and/or an iodide and a hydrogen peroxide and a hydrogen bromide, and/or hydrogen iodide advances comparatively for a short time. For example, when the bromide and/or iodide of a peracetic-acid water solution and alkali metal are mixed, Or the concentration of the hypobromous acid generated when a hydrogen peroxide, a hydrobromic acid, and/or a hydroiodic acid are mixed, and/or hypoiodous acid rises promptly. Since there is an inclination which attains after about 3 minutes in the former, and attains to maximum in the latter after about 5 minutes, hypobromous acid and/or hypoiodous acid decompose gradually after that, and a bactericidal effect decreases It is desirable to mix both water solutions beforehand, just before mixing both water solutions in the drainage system for sterilization or adding to the drainage system for sterilization.

[0031] Although it may face enforcing the approach of this invention, a peracetic-acid water solution or a hydrogen-peroxide-solution solution, and the water solution containing bromine ion and/or iodine ion may be mixed by the mixing chamber of respectively dedication and the obtained mixed liquor may be added to the drainage system for sterilization, it is simple to perform mixing and addition using established thin piping usually prepared in order to add drugs to an object drainage system. That is, it is simple to pour separately a peracetic-acid water solution or a hydrogen-peroxide-solution solution, and the water solution containing bromine ion and/or iodine ion into established thin piping, to make both water solutions join, to mix while resulting in the drainage system for sterilization, and to add to the drainage system for sterilization as it is.

[0032] Moreover, as long as the matter which can supply the matter which can generate a peracetic acid or a hydrogen peroxide and bromine ion, and/or iodine ion dissolves in the water for sterilization promptly, the generated peracetic acid or the hydrogen peroxide, and bromine ion and/or iodine ion react promptly and hypobromous acid and/or hypoiodous acid generate, the matter which can supply the matter, the bromine ion, and/or the iodine ion which can generate a peracetic acid or a hydrogen peroxide may be added to the drainage system for sterilization with a powder gestalt. For example, in the case of the combination of the powder (BYUSAN 1000) which generates a peracetic acid, and sodium-bromide powder, this approach is employable.

[0033] Although both may be separately added to the drainage system for sterilization when using each matter with a powder gestalt as mentioned above, it can consider as the powder pharmaceutical preparation which mixed both beforehand, or powder pharmaceutical preparation can also be used as a tablet agent which carried out press molding using binders, such as a calcium sulfate. What is necessary is just to set up the blending ratio of coal of each matter suitably so that the hypobromous acid and/or hypoiodous acid of concentration expected in the inside of the drainage system for sterilization may generate. Thus, if the matter dealt with is a solid-state, it is advantageous in respect of transportation, storage, workability, etc.

[0034] In this invention, although the effective concentration of the hypobromous acid in the drainage system for sterilization and/or hypoiodous acid changes with existence of the temperature of the class of microorganism for sterilization, a number, and the drainage system for sterilization, pH, a nutrient, and/or the organic substance etc., it is 0.01 - 2 mg/l in available chlorine concentration conversion to the water for sterilization, and is usually 0.5 - 1 mg/l preferably. The outstanding bactericidal effect is acquired without having a bad influence on the metallic material of the structure which holds an object drainage system, if the concentration of the hypobromous acid in the drainage system for sterilization and/or hypoiodous acid is the above-mentioned range.
[0035] By the sterilization approach of this invention, a well-known sterilization component and a corrosion prevention component can be used together in the range which does not check this effect of the invention. As such a well-known germicide, organic bromine system compounds, such as 2-nitro-2-BUROMO-1,3-propanediol, 2, and 2-dibromo-2-nitro ethanol and 2,2-dibromo-3-nitrilopropioneamide, are mentioned. Moreover, as well-known anticorrosives, phosphonate, such as phosphate [, such as sodium phosphate and potassium phosphate,], 1, and 1-hydroxy ethane diphosphonic acid sodium, 1, and 1-hydroxy ethane diphosphonic acid, etc. is mentioned.
[0036] the paper-making process in the cooling water network in various works, such as petrochemical works which are using industrial water, seawater, lake water, river water, etc. as a drainage system for sterilization in the sterilization approach of this invention, a chemical plant, and thermal power, a nuclear power plant, a wash water network, a wastewater (waste water) processing network, and paper and a pulp mill -- a water system, a pulp slurry, etc. are mentioned.
[0037] Moreover, the sterilization approach of this invention is applicable also to disinfection and sterilization of various instruments, such as various industrial products and a medical-application machine instrument. Disinfection and sterilization of an instrument are performed by specifically immersing various industrial products or a medical-application machine instrument in this by using the mixed liquor of a peracetic-acid water solution or a hydrogen-peroxide-solution solution, and the water solution containing bromine ion and/or iodine ion as an antibacterial or sterilization liquid.
[0038]
[Example] This invention is not limited by these examples although an example explains this invention concretely.
[0039] Mixed liquor was prepared using example of preparation preparation 1 peracetic acid (the Aldrich make, the reagent, 32 % of the weight solution of acetic-acid dilution), the sodium bromide (KISHIDA chemistry incorporated company make, reagent chemicals), or potassium iodide (KISHIDA chemistry incorporated company make, reagent chemicals) of mixed liquor. First, the peracetic acid was diluted with ion exchange water, and the peracetic-acid water solution of mol concentration 1 mol/l of a peracetic acid, 0.1 mol/l, and 0.01 mol/l was prepared. Moreover, the sodium bromide was dissolved in ion exchange water, and the sodium-bromide water solution of mol concentration 1 mol/l of bromine ion, 0.1 mol/l, and 0.01 mol/l was prepared. Furthermore, potassium iodide was dissolved in ion exchange water, and the potassium iodide water solution of mol concentration 0.1 mol/l of iodine ion was prepared.
[0040] Put the peracetic-acid water solution, sodium-bromide water solution, or potassium iodide water solution of the mol concentration shown in Table 1, and capacity into the test tube, mixed it for 5 minutes, a peracetic acid, a sodium bromide, or potassium iodide was made to react, and mixed liquor was obtained. Subsequently, the sodium hydroxide was added into mixed liquor, and it adjusted so that mixed liquor might become alkalinity (about ten pH). The obtained mixed liquor was added to 1l. of ion exchange water, and this was made into trial water.
[0041] Mixed liquor was prepared using 235% hydrogen peroxide (the Mitsubishi Gas Chemical Co., Inc. make, food additive) of examples of preparation, and 47% hydrobromic acid (KISHIDA chemistry incorporated company make, reagent chemicals). First, the hydrogen peroxide was diluted with ion exchange water 35%, and the hydrogen-peroxide-solution solution of the mol concentration shown in Table 2 was prepared. Moreover, the hydrobromic acid was diluted with ion exchange water 47%, and the hydrobromic acid of the mol concentration shown in Table 2 was prepared.

[0042] Put the hydrogen-peroxide-solution solution and hydrobromic acid of the mol concentration shown in Table 2, and capacity into the test tube, mixed them for 3 minutes, the hydrogen peroxide and the hydrobromic acid were made to react, and mixed liquor was obtained. Subsequently, the obtained mixed liquor was added to 1l. of ion exchange water, and this was made into trial water. The range of pH of test fluid was 7.1-8.2.
[0043] Trial underwater the hypobromous acid or hypoiodous acid concentration (available chlorine concentration conversion) of hypobromous acid concentration of the example 1 of measurement 1 preparation was measured with the orthotolidine method. [of trial water] As a comparison, available chlorine concentration was measured about the trial water of only a peracetic-acid water solution or a sodium-bromide water solution as well as the above. It is shown in Table 1 with the mol concentration and capacity of the water solution using the obtained result.
[0044]
[Table 1]

No.	過酢酸水溶液			ハロゲン化合物水溶液				有効塩素濃度	モル数
	モル濃度 mol/l	容量 ml	モル数 mol	化合物	モル濃度 mol/l	容量 ml	モル数 mol	mgCl/l	mol
1	1	0.1	1.0×10^{-4}	NaBr	1	0.1	1.0×10^{-4}	0.2	2.5×10^{-6}
2	0.1	1	1.0×10^{-4}	NaBr	0.1	1	1.0×10^{-4}	1.0	1.3×10^{-5}
3	0.1	0.1	1.0×10^{-5}	NaBr	0.1	1	1.0×10^{-4}	0.1	1.3×10^{-6}
4	0.1	0.5	5.0×10^{-5}	NaBr	0.1	1	1.0×10^{-4}	0.5	6.3×10^{-6}
5	0.1	0.5	5.0×10^{-5}	NaBr	0.1	2	2.0×10^{-4}	0.5	6.3×10^{-6}
6	0.1	1	1.0×10^{-4}	NaBr	0.1	2	2.0×10^{-4}	1.0	1.3×10^{-5}
7	0.01	5	5.0×10^{-5}	NaBr	0.1	3	3.0×10^{-4}	0.3	3.8×10^{-6}
8	0.01	5	5.0×10^{-5}	NaBr	0.1	5	5.0×10^{-4}	0.5	6.3×10^{-6}
9	0.1	1	1.0×10^{-4}	KI	0.1	1	1.0×10^{-4}	測定不能	———
10	----	---	------	NaBr	1	0.1	1.0×10^{-4}	不検出	———
11	1	0.1	1.0×10^{-4}	NaBr	----	---	------	不検出	———

[0045] With 0.1ml of 1 mol/l peracetic-acid water solutions, and 0.1ml [of 1 mol/l sodium-bromide water solutions] mixed liquor, the halogen smell strong during mixing occurred and mixed liquor changed to yellow. The available chlorine concentration of corresponding trial water was 0.2 mgCl/l (No.1). With 1ml of 0.1 mol/l peracetic-acid water solutions, and 1ml [of 0.1 mol/l sodium-bromide water solutions] mixed liquor, the halogen smell occurred slightly during mixing and mixed liquor changed to yellow. The available chlorine concentration of corresponding trial water was 1.0 mgCl/l (No.2). The above-mentioned result shows that a reaction cannot occur easily when each solution is thin even if it is the case where a peracetic acid and a sodium bromide are made to react by the mole ratio 1:1.
[0046] The available chlorine concentration of the trial water using the mixed liquor prepared combining the peracetic-acid water solution and sodium-bromide water solution of various concentration and capacity was 0.1 - 1.0 mgCl/l (No.3-8). Although the available chlorine concentration of the trial water using 1ml of 0.1 mol/l peracetic-acid water solutions and the mixed liquor prepared from 1ml of 0.1 mol/l potassium iodide water solutions instead of the sodium-bromide water solution cannot be measured at an orthotolidine method, this trial water presented blue by adding a starch solution (No.9).
[0047] Available chlorine was not detected when it considered as trial water only using 1ml only of 1 mol/l peracetic-acid water solutions, and 1ml of 1 mol/l sodium-bromide water solutions (No.10 and No.11). As for this, only a peracetic acid shows that hypobromous acid does not generate only with bromine ion.
[0048] As for the result of No.9, not only bromine ion but iodine ion shows that a reaction with a peracetic acid advances. Moreover, it turns out that the generation reaction of hypobromous acid occurs from an experiment when the mole ratios of a peracetic acid and bromine ion are 1:1 - 1:10.
[0049] The trial underwater hypobromous acid (available chlorine concentration conversion) of the example 2 of measurement 2 preparation of the hypobromous acid concentration of trial water was measured with the orthotolidine method. As a comparison, available chlorine concentration was

measured about a hydrogen-peroxide-solution solution or the trial water of only a hydrobromic acid as well as the above. It is shown in Table 2 with the mol concentration and capacity of the water solution using the obtained result.
[0050]
[Table 2]

No.	過酸化水素水溶液			臭化水素酸			有効塩素濃度	モル数
	モル濃度 mol/l	容量 ml	モル数 mol	モル濃度 mol/l	容量 ml	モル数 mol	mgCl/l	mol
12	3.0	0.005	1.5×10^{-5}	8.6	0.005	4.3×10^{-5}	0.1	1.3×10^{-6}
13	3.0	0.005	1.5×10^{-5}	8.6	0.020	1.7×10^{-4}	0.1	1.3×10^{-6}
14	3.0	0.010	3.0×10^{-5}	8.6	0.010	8.6×10^{-5}	0.2	2.5×10^{-6}
15	3.0	0.015	4.5×10^{-5}	8.6	0.015	1.3×10^{-4}	0.3	3.8×10^{-6}
16	3.0	0.020	6.0×10^{-5}	8.6	0.020	1.7×10^{-4}	0.4	5.0×10^{-6}
17	3.0	0.025	7.5×10^{-5}	8.6	0.025	2.2×10^{-4}	0.5	6.3×10^{-6}
18	3.0	0.030	9.1×10^{-5}	8.6	0.030	2.6×10^{-4}	0.6	7.5×10^{-6}
19	3.0	0.050	1.5×10^{-4}	8.6	0.050	4.3×10^{-4}	1.0	1.3×10^{-5}
20	3.0	0.187	5.9×10^{-4}	-----	---	---------	不検出	———
21	-----		---------	8.6	0.100	8.6×10^{-4}	不検出	———

[0051] The available chlorine concentration of the trial water using the mixed liquor prepared combining the hydrogen-peroxide-solution solution and hydrobromic acid of various concentration and capacity was 0.1 - 1.0 mgCl/l (No.12-19).
[0052] Available chlorine was not detected when it considered as trial water only using 0.187ml only of 3.0 mol/l hydrogen-peroxide-solution solutions, and 0.100ml of 8.6 mol/l hydrobromic acids (No.20 and No.21). As for this, only a hydrogen peroxide shows that hypobromous acid does not generate only with bromine ion.
[0053] Moreover, it turns out that the generation reaction of hypobromous acid occurs from an experiment when the mole ratio of a hydrogen peroxide and bromine ion is about 1:3.
[0054] The solution containing the bactericidal effect verification-test gram positive and gram negative of mixed liquor of a peracetic-acid water solution and a sodium-bromide water solution was prepared (initial number of microorganism : 4.3x107 pieces/(ml)), and 1l. of obtained solutions was extracted to the beaker with a capacity of 1l. 1ml (A liquid) of peracetic-acid water solutions and 1ml (B liquid) of 1.0% sodium-bromide water solutions were mixed 2.5%, and the mixed liquor made to react for 3 minutes was added to the beaker. After adding mixed liquor, after 1 hour, 3 hours, and 6-hour progress, the bacterial count measurement simple culture-medium easy cult was immersed in the solution of a beaker, and the number of microorganism in a solution was measured in simple. Moreover, the number of microorganism in a solution was measured by the standard agar-medium method after 24-hour progress.
[0055] Moreover, number of microorganism was measured about the thing which added what adds neither A liquid nor B liquid (blank), A liquid, or B liquid as well as the above. The obtained result is shown in Table 3 and drawing 1 . the inside of drawing, and ** -- as for a blank and **, only as for A liquid, only B liquid shows [as for **] the case of the mixed liquor of A liquid and B liquid, as for **. In addition, the measurement result of the initial number of microorganism of the solution containing a gram positive and a gram negative is collectively shown in drawing 1 .
[0056]
[Table 3]

	菌数（個／ml）			
	1時間後	3時間後	6時間後	24時間後
①ブランク	4.7×10^{6}	4.3×10^{6}	5.1×10^{6}	7.2×10^{7}
②A液	7.7×10^{5}	9.1×10^{5}	6.2×10^{5}	8.9×10^{5}
③B液	6.3×10^{6}	5.5×10^{6}	7.6×10^{6}	5.4×10^{6}
④A液＋B液	1.2×10^{4}	5.0×10^{4}	2.1×10^{4}	3.5×10^{4}

[0057] Table 3 and drawing 1 show having the bactericidal effect excellent in the mixed liquor of A liquid and B liquid, i.e., the mixed liquor of a peracetic-acid water solution and a sodium-bromide water solution.
[0058] The solution shown in the bactericidal effect verification-test table 4 of the mixed liquor of a hydrogen-peroxide-solution solution and a hydrobromic acid was prepared (initial number of microorganism : 1x107 pieces/(ml)), and 1l. of obtained solutions was extracted to the beaker with a capacity of 1l. The hydrogen-peroxide-solution solution and hydrobromic acid which are shown in Table 2 were mixed, and it added to the beaker so that it might become the available chlorine concentration which shows the mixed liquor (No.12-19) made to react for 3 minutes in Table 5. [0059] which was immersed in the solution of a beaker in the bacterial count measurement simple culture-medium easy cult, and measured the number of microorganism in a solution in simple after progress for 30 minutes after adding mixed liquor
[Table 4]

項　目	試験水
pH	8．5
酸消費量 (pH 4.8) ($mgCaCO_3/l$)	125
全硬度 ($mgCaCO_3/l$)	250
カルシウム硬度 ($mgCaCO_3/l$)	200
塩化物イオン ($mgCl^-/l$)	125
硫酸イオン ($mgSO_4{}^{2-}/l$)	75
イオン状シリカ ($mgSiO_2/l$)	35

[0060] It is shown in Table 5 with the available chlorine concentration of the mixed liquor which added the obtained result.
[0061]
[Table 5]

No.	有効塩素濃度 (mgCl/l)	菌数 (個／ml)
12	0.1	1.0×10^7
13	0.1	1.0×10^7
14	0.2	1.0×10^7
15	0.3	1.0×10^7
16	0.4	1.0×10^7
17	0.5	1.0×10^4
18	0.6	1.0×10^3
19	1.0	< 100

[0062] Table 5 shows that a hydrogen-peroxide-solution solution and the mixed liquor of a hydrobromic acid have the bactericidal effect excellent in 0.5 or more mgCl/l of available chlorine concentration.
[0063] When it dissolved in measurement 3 water of the hypobromous acid concentration of trial water, mixed liquor was prepared using powder, and BYUSAN 1000 (made in Buckman Laboratories, Inc.) and the sodium bromide (KISHIDA chemistry incorporated company make, reagent chemicals) which generate a peracetic acid. First, BYUSAN 1000 and the sodium bromide of weight which are shown in Table 6 were added and dissolved at 100ml of ion exchange water, and mixed liquor was prepared. The hypobromous acid in mixed liquor (available chlorine concentration conversion) was measured with the orthotolidine method after [of preparation] 5 minutes. It is shown in Table 6 with the mol concentration (only sodium bromide) and capacity of the water solution using the obtained result.
[0064] In addition, since the peracetic acid of 0.35 g/l is generated also at the lowest when BYUSAN 1000 is dissolved in water by the concentration of 1 g/l, the mol concentration of the peracetic acid in the water solution when dissolving BYUSAN 1000 of Wg in 100ml water (molecular weight 76) is

called for by the degree type.
W [mol concentration =0.35/0.1xW] of peracetic acid/76 [0065]
[Table 6]

No.	ビューサン1000	臭化ナトリウム		有効塩素濃度	モル数
	重量 g	重量 g	モル数 mol	mgCl/l	mol
22	0.0030	0.0030	2.9×10^{-5}	0.4	5.0×10^{-7}
23	0.0016	0.0016	1.6×10^{-5}	0.2	2.5×10^{-7}
24	0.0500	0.0500	4.9×10^{-4}	20.0	2.5×10^{-6}
25	0.0030	0.0060	5.8×10^{-5}	0.5	6.3×10^{-7}
26	0.0030	0.0120	1.2×10^{-4}	1.0	1.3×10^{-6}
27	0.0060	0.0030	2.9×10^{-5}	1.0	1.3×10^{-6}
28	0.0120	0.0030	2.9×10^{-5}	2.0	2.5×10^{-6}
29	0.0030	-	-	不検出	

[0066] The solution containing eye bactericidal effect ********* of the powder and sodium bromide which generate a peracetic acid, a gram positive, and a gram negative was prepared (initial number of microorganism : 1.0x103 pieces/(ml)), and 1l. of obtained solutions was extracted to the beaker with a capacity of 1l. Next, it added to the beaker at coincidence and 0.015g (BYUSAN 1000) of powder which generates a peracetic acid, and 0.015g (KISHIDA chemistry incorporated company make, reagent chemicals) of sodium bromides were stirred for 5 minutes. The number of microorganism in a solution was measured by the standard agar-medium method after stirring. Moreover, number of microorganism was measured about the additive-free thing (blank) as well as the above. The obtained result is shown in Table 7.
[0067]
[Table 7]

試験	菌数（個／ml）
ビューサン1000＋臭化Na	不検出
Blank	1.0×10^{3}

[0068] Even if it adds the matter which can generate a peracetic acid, and the matter which can supply bromine ion from Table 7 to the drainage system for sterilization with a powder gestalt, it turns out that the outstanding bactericidal effect is demonstrated.
[0069]
[Effect of the Invention] The sterilization approach of the drainage system in this invention can make the hypobromous acid and/or hypoiodous acid which cannot make easily the metallic material of the structure which sterilizing properties are not influenced by change of pH of the drainage system for sterilization, and holds a drainage system corrode able to generate on-site (water system for sterilization) cheaply, safely, and simple, and can sterilize the drainage system for sterilization notably. Moreover, this approach can sterilize the drainage system for sterilization notably, without raising the concentration of hypobromous acid and/or hypoiodous acid, even if the description of amount of water or a drainage system changes conjointly with a combined effect with the peracetic-acid water solution or hydrogen-peroxide-solution solution which is an unreacted raw material.

[Translation done.]